



Medical Force Protection: Panama

Medical Force Protection countermeasures required before, during, and after deployment to the "area" are as follows:

Major Threats

Diarrhea, respiratory diseases, injuries, hepatitis A, dengue fever, leptospirosis, rabies, Brucellosis, malaria, other arthropod-borne infections, sexually transmitted diseases, heat injury, and Chaga's disease. Raw sewage, industrial wastes, agrochemicals, and salt-water intrusion may contaminate water.

Requirements before Deployment

1. **Before Deploying report to Medical to:**
 - a. Ensure your Immunizations are up to date, specific immunizations needed for area: **Hepatitis A, MMR, Polio, Typhoid, Yellow fever, Tetanus (Td), and Influenza.**
 - b. If you have not been immunized against Hepatitis A (two dose series over 6 months) get an injection of Immunoglobulin with the initial Hepatitis A dose.
2. **Malaria Chemoprophylaxis:**

Must include Primaquine terminal prophylaxis (see "Requirements after deployment")

 - a. **Chloroquine 500 mg/week 2 weeks prior to entering Panama, and until 4 weeks after departure.**
 - b. **Mefloquine 250 mg/week 2 weeks prior to entering Panama, until 4 weeks after departure**
 - c. **Doxycycline 100 mg/day 2 days prior to entering Panama, until 4 weeks after departure.**
3. **Get HIV testing if not done in the past 12 months.**
4. **Make sure you have or are issued from unit supply: DEET, permethrin, bednets/poles, sunscreen and lip balm. Treat utility uniform and bednet with permethrin.**

Requirements during Deployment

1. Consume food, water, and ice only from US-approved sources; **"Boil it, cook it, peel it, or forget it".**
2. Involve preventive medicine personnel with troop campsite selection.
3. Practice good personal hygiene, hand-washing, and waste disposal.
4. Avoid sexual contact. If sexually active, use condoms.
5. Use DEET and other personal protective measures against insects and other arthropod-borne diseases. Personal protective measures include but are not limited to proper wear of uniform, use of bed nets, and daily "buddy checks" in tick and mite infested areas.
6. Minimize non-battle injuries by ensuring safety measures are followed. Precautions include hearing and eye protection, enough water consumption, suitable work/rest cycles, acclimatization to environment, and stress management.
7. Eliminate food/waste sources that attract pests in living areas.
8. Avoid contact with animals and hazardous plants.

Requirements after Deployment

1. Receive preventive medicine debriefing after deployment.
2. Seek medical care immediately if ill, especially with fever.
3. Get HIV and PPD testing as required by your medical department or Task Force Surgeon.
4. Malaria terminal prophylaxis: Primaquine 15 mg/day beginning on day of departure for 14 days, unless G-6 PD deficient.

VECTOR RISK ASSESSMENT PROFILE (VECTRAP): Panama

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1. GEOGRAPHY: Area - 77,381 sq. km. (29,762 sq. mi.); about the size of South Carolina. **Capital City** - Panama City (metro area pop. 770,000). **Terrain** - Mountainous with coastline. **Climate** - Tropical. Rainy season from May to December.

2. VECTOR-BORNE DISEASES:

a. **Malaria:** Transmission is year-round, principally in rural areas of eastern (Darien and San Blas) and western (Bocas Del Toro, Chiriqui, and Veraguas) provinces. Areas adjacent to the Panama Canal and all main urban areas are considered risk-free.

Endemic incidence increased sharply during the mid to late 1980's. During 1995-1996, outbreaks of malaria were reported from both western and eastern areas. Vivax malaria predominates. Falciparum malaria accounts for approx. 6 to 15 percent of the approximately 1,000 to 1,200 cases reported annually.

Malaria has had the greatest impact on the Cuna Indian tribes. These tribes have consistently failed to comply with accepted standards of malaria prophylaxis and treatment, and have resisted efforts to effect vector control measures in their territories. *Plasmodium vivax* (55%) and *P. falciparum* (45%) are the causative agents in these areas.

Chloroquine-resistant falciparum malaria may occur in all malarious areas east of the Canal and in the vicinity of Gatun Lake, west of the Canal. Unconfirmed late 1990 reports indicated that chloroquine-resistant cases had occurred in extreme northwestern Panama near the border with Costa Rica. Fansidar-resistant cases have been reported from northeastern Colon Province, but these may have been imported from Colombia.

b. **Dengue fever:** After a long absence, dengue returned to Panama in the early 1990's. In 1995, approx. 2,900 dengue cases had been confirmed countrywide for the year (including at least 3 cases of dengue hemorrhagic fever/dengue shock syndrome); this number greatly exceeded the 1994 total of 783 confirmed cases. As of October 1996, approx. 450 cases had been reported for the year. All four dengue viral serotypes circulate regionally, with den 1 and den 2 predominating. Increased incidence of cases typically occurs with the onset of the rainy season in May. Case totals typically decline with the onset of the dry season, which usually begins during December. According to the Ministry of Health, by November 1999, 1598 cases of classical dengue fever and one case of dengue hemorrhagic fever were reported. Some 11,740 cases of dengue fever were reported in Panama in the past 6 years. The greatest number of cases, 3,083 was recorded in 1995, including 3 cases of DHF. In 1996, there were a total of 2,641 cases; in 1998 there were 2,802.

c. **Cutaneous Leishmaniasis** is found countrywide at low levels of endemicity in rural and heavily forested areas. The most intense foci appear located in eastern and south central areas. Risk presumably is related to vector densities which appear highest overall from May through July and November-December, but with considerable interspecies variation. Most cases of leishmaniasis are reported from January through July. Etiological agents for cutaneous leishmaniasis in Panama include members of both the *Leishmania braziliensis* and *L. mexicana* complexes. Most cases are presumed to be caused by *L. braziliensis* because the sand fly vectors for *L. mexicana* are not strongly anthropophilic. Outbreaks of cutaneous leishmaniasis have occurred among non-indigenous military personnel undergoing jungle training, and cases of mucocutaneous leishmaniasis (caused by *L. b. panamensis*) have occurred among indigenous personnel. Zoonotic reservoirs for cutaneous and mucocutaneous leishmaniasis include several species of mammals, particularly the 2-toed sloth.

Leishmania chagasi, vectored by the peridomestic species *Lu. longipalpus*, and usually associated with **visceral leishmaniasis**, also has been isolated from cutaneous lesions. Dogs are a common enzootic reservoir for *L. chagasi*.

d. **Arboviral encephalitides:** Arboviral encephalitides are transmitted by several genera of mosquitoes. Arboviruses reported from Panama include **St. Louis encephalitis (SLE)**, **Eastern (EEE)**, **Western (WEE)**, and **Venezuelan (VEE) equine encephalitis**. Human involvement appears minimal; small outbreaks of VEE have occurred near Ft. Sherman, on the Caribbean side of the isthmus. No human incidence data are available for **Mayaro virus fever**, but serological evidence of zoonotic circulation has been reported.

The last cases of **Yellow Fever** in Panama occurred in 1973, close to the Colombian border.

Chagres virus fever (CVF) and **Punta Toro virus fever (PTVF)** are presumably vectored by sand flies (*Lutzomyia* spp.). Serological evidence of CVF infection was detected in several areas in the mid-1970's, particularly in the Las Perlas Islands. Human cases of infection PTVF have occurred near the Panama Canal. Sand flies also vector **vesicular stomatitis virus** (Indiana serotype).

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Oropouche virus fever is presumably vectored by biting midges (Ceratopogonidae: *Culicoides* spp.). An outbreak occurred in August 1989, about 60 kilometers west of Panama City.

e. **Chagas' Disease (American Trypanosomiasis)** is found at low levels of endemicity throughout the majority of the rural areas, including some parts of the Canal Zone. The risk of acquiring this disease is considered low but may increase focally. Zoonotic reservoirs include a wide variety of domestic (e.g., dogs, cats) and wild animals.

3. OTHER HEALTH THREATS: Leptospirosis presumably is a threat year-round. Elevated risk is correlated with periods of heavy rainfall (usually October through December). Distribution is countrywide wherever conditions favor flooding of low-lying areas. Remarks: Relatively few cases reported, but many probably go undiagnosed. Outbreaks have occurred among military personnel undergoing jungle training exercises. At least 12 serovars have been associated with human illness in Panama, with most cases attributed to serovars Bataviae, Panama, and Tarassovi.

4. DISEASE VECTOR INFORMATION:

a. The primary vector of malaria is the mosquito *Anopheles albimanus*. *An. albimanus* distribution is mainly coastal. It may feed indoors. Larvae usually are found in sunlit bodies of fresh or brackish water (ponds, pools, lagoons, etc.). *An. albimanus* reportedly is resistant to the insecticides DDT, Dieldrin, Lindane, and Malathion, and is beginning to show tolerance to Fenitrothion and Propoxur.

An. punctimacula is a secondary vector of malaria. This species usually occurs in the interior of the country. It may feed indoors. The larvae usually are found in cooler, densely shaded water.

b. Dengue fever and yellow fever is transmitted by *Aedes aegypti*. This is a peridomestic mosquito that prefers to breed in artificial containers near human habitations. It is diurnally (i.e., daytime) active and feeds indoors or out, often biting around the neck or ankles. It typically rests indoors after feeding. *Ae. aegypti* is known to be resistant to DDT, Dieldrin and Lindane.

c. The reputed vectors of Chagas' disease are the reduviid bugs *Triatoma dimidiata* and *Rhodnius pallescens*. Many reduviid species are sylvatic and their habitats are associated with animal burrows or nests. However, peridomestic species are responsible for most disease transmission to humans. These bugs are typically associated with poor housing areas (i.e., habitations with adobe walls, thatched-roofs, and/or earthen-floors provide innumerable daytime harborage sites). Reduviids may also be associated with woodpiles, stored clothing, and pet or domestic animal shelters.

Feeding occurs at night. Risk of being bit is higher when sleeping in close contact with soil. The face and surrounding areas of exposed skin are favored feeding sites. Rubbing bug feces into the wound sites created by the feeding insects transmits disease pathogens.

Most sand flies are active between dusk and dawn and have very limited flight ranges. Biting activity tends to be bimodal, with a strong peak in late evening and a smaller peak in the predawn hours. Highest sand fly populations appear associated with densely wooded but well-drained hillside environments. Potential vector species include *Lutzomyia gomezi*, *Lu. panamensis*, *Lu. sanguinaria*, *Lu. shannoni*, *Lu. trapidoi*, and *Lu. glephiletor*.

5. DISEASE AND VECTOR CONTROL PROGRAMS:

a. Prevention & Control: Malaria chemoprophylaxis in endemic areas should be mandatory. Consult the Navy Environmental Preventive Medicine Unit #2 in Norfolk, VA (COMM: 757-444-7671; DSN: 564-7671; FAX: 757-444-1191; PLAD: NAVENPVNTMEDU TWO NORFOLK VA) for the current chemoprophylaxis recommendations.

b. Yellow fever immunizations should be current.

c. The conscientious use of personal protective measures will help to reduce the risk of many vector-borne diseases. The most important personal protection measures include the use of DEET insect repellent on exposed skin, wearing permethrin-treated uniforms, and wearing these uniforms properly. The use of DEET 33% lotion (2 oz. tubes: NSN 6840-01-284-3982) during daylight and evening/night hours is recommended for protection against a variety of arthropods including mosquitoes, sand flies, other biting flies, fleas, ticks and mites. Uniforms should be treated with 0.5% permethrin aerosol clothing repellent (NSN 6840-01-278-1336), per label instructions. NOTE: This spray is only to be applied to trousers and blouse, not to socks, undergarments or covers. Reducing exposed skin (e.g., rolling shirt sleeves down, buttoning collar of blouse, blousing trousers) will provide fewer opportunities for blood-feeding insects and other arthropods. Additional protection from mosquitoes and other biting flies can be accomplished by the use of screened eating and sleeping quarters, and by limiting the amount of outside activity during the evening/night hours when possible. Bednets (insect bar [netting]: NSN 7210-00-266-9736) may be treated with permethrin for additional protection.

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d. The most important element of an *Aedes aegypti* control program is SOURCE REDUCTION. Eliminating or covering all water holding containers in areas close to human habitation will greatly reduce *A. aegypti* populations. Alternatively, containers may be emptied of water at least once a week to interrupt mosquito breeding. Sand or mortar can be used to fill tree holes and rock holes near encampments.

e. It is unclear the extent to which *An. albimanus* is repelled by DEET. However, in the absence of clear cut evidence to the contrary,

DEET should be utilized in the conventional manner.

f. Because the breeding habitats of most sand fly species are not easily identified, not easily accessible, or unknown, control strategies focus mainly on adult sand flies. Spraying residual insecticides on buildings, (including screening on portals of entry) animal shelters, and other adult resting sites can control Peridomestic sand fly species. Area chemical control of sylvan sand fly species is impractical. Personal protective measures will reduce sand fly bites and environmental modification (e.g., clearing forests, eliminating rodent burrows/breeding sites, relocating domestic animals away from human dwellings) has been used to reduce local sand fly populations.

g. Control for peridomestic reduviids is based upon improvements to human habitations; debris and harborage sites in and around habitations should be eliminated. Infested habitations should be treated with residual insecticides applied to walls and other surfaces. Bednets should be used in infested houses.

h. Expanded Vector Control recommendations are available upon request.

6. IMPORTANT REFERENCES:

Contingency Pest Management Pocket Guide Technical Information Memorandum(TIM)24. Available from the Defense Pest Management Information Analysis Center (DPMIAC) www.afpmb.org/pubs/tims/ (DSN: 295-7479 COMM: (301) 295-7479). Best source for information on vector control equipment, supplies, and use in contingency situations.

Control of Communicable Diseases Manual-Edited by James Chin. Seventeenth Ed. 2000. Available to government agencies through the Government Printing Office. Published by the American Public Health Association. Excellent source of information on communicable diseases.

Medical Environmental Disease Intelligence and Countermeasures-(MEDIC). January 2002. Available on CD-ROM from Armed Forces Medical Intelligence Center, Fort Detrick, Frederick, MD 21702-5004. A comprehensive medical intelligence product that includes portions of the references listed above and a wealth of additional preventive medicine information.

Internet Sites- Additional information regarding the current status of vector-borne diseases in this and other countries may be found by subscribing to various medical information sites on the internet. At the Centers of Disease Control and Prevention home page subscriptions can be made to the Morbidity and Mortality Weekly Report(MMWR)and the Journal of Emerging Infectious Diseases. The address is www.cdc.gov. The World Health Organization Weekly Epidemiology Report (WHO-WER) can be subscribed to at www.who.int/wer. The web site for PROMED is <http://www.promedmail.org/>.

Although PROMED is not peer reviewed, it is timely and contains potentially useful information. The CDC and WHO reports are peer reviewed. Information on venomous arthropods such as scorpions and spiders as well as snakes, fish and other land animals can be found at the International Venom and Toxin Database website at <http://www.kingsnake.com/toxinology/>. Information on anti-venom sources can also be found at that site. Information on Poisonings, Bites and Envenomization as well as poison control resources can be found at www.invivo.net/bg/poison2.html.

USERS OF THIS VECTRAP: Please notify NDVECC Jacksonville, or the appropriate NEPMU, if you acquire any medical entomology information that can be used to update this VECTRAP.

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ADDITIONAL INFORMATION ON DISEASE VECTOR SURVEYS, CONTROL AND SPECIMEN ID's WILL BE PROVIDED UPON REQUEST.